

ABSTRACT OF THE DISCLOSURE

A water heating system including a water storage vessel; a water circuit; first and second heat exchangers operably disposed in the water circuit; and a vapor compression system defining a refrigerant circuit. The vapor compression system includes first and second compressor mechanisms. The first compressor mechanism compresses the refrigerant from suction pressure to intermediate pressure. The second compressor mechanism compresses the refrigerant from the intermediate pressure to a supercritical discharge pressure. The first heat exchanger is operably disposed in the refrigerant circuit between the first and second compressor mechanisms, and exchanges heat between intermediate pressure refrigerant and water. An expansion device is operably disposed in the refrigerant circuit. An evaporator is operably disposed in the refrigerant circuit between expansion device and first compressor mechanism. The second heat exchanger is operably disposed in the refrigerant circuit between second compressor mechanism and expansion device, and uses the supercritical refrigerant to heat water.